Elderhorst. A Manual of Blowpipe Analysis, and Determinative Mineralogy. By Wm. Elderhorst, M. D. Third edition, Revised and greatly enlarged. 12mo. pp. 179. Phila.: *Ellwood Zell.* Flex. Cl.—$2 50.

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Gilbert. Chemistry Victorious over Cholera. By J. P. Gilbert, M. D. 8vo. pp. 23. N. Y.: *Amer. News Co.* Pap. 25 cts.

Larkin. The Practical Brass and Iron Founder's Guide: a Concise Treatise on Brass Founding, Moulding, the Metals and their Alloys, etc. To which are added Recent Improvements in the Manufacture of Iron, Steel by the Bessemer Process, etc. By James B. Larkin. Fifth Edition, revised, with extensive Additions. 12mo. pp. 301. Phila.: *Henry Carey Baird.* Cl.—$2 25.

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Zeis. The Gas-Meter, and its Operations. Illustrated for the Benefit of the Consumer. By Victor Zeis. 12mo. pp. 8. Cincinnati: *The Author.* Pap.—$25 cts.

# Selected Articles.

## CHEMISTRY BY THE FIRESIDE.

*Continued from page* 162

### No. 11.—Hydrogen.

We told you in our last conversation that hydrogen exists in water, animal and vegetable substances, and that by decomposing water by means of zinc and sulphuric acid, we could readily obtain it in large quantities. We wish now to notice its properties.

In looking at a jar of hydrogen you would see nothing to distinguish it from common air. It has neither taste nor color, nor has it ever been liquified. Place it in the most powerful press ever invented by man and it would still be a gas. When mingled with air in large quantities, you can breath it, but you would not know your own voice; you could only give a shrill squeak which would seem as hideous to yourself as to those who heard you. Ring a bell in hydrogen, and you can scarcely hear it. No animal can live in pure hydrogen, for it must have oxygen to sustain life.

But the most remarkable property of hydrogen is its great lightness. It is fourteen and a half times lighter than common air. A soap bubble filled with it will rise in the air. This is the substance usually employed to fill balloons. If you should take a turkey's crop, and carefully clean it and dry it, and fill it with hydrogen, you would have a balloon on a small scale. Balloons have been constructed on this principle capable of holding several hundred pounds in weight. But there is one great difficulty in using hydrogen. It is supposed that the molecules, or particles of which hydrogen is composed are smaller than in any other substance. The smallest crack in a glass jar will cause the hydrogen to pass through it. Balloons are made of varnished silk, but it is a very difficult matter to prevent the hydrogen from passing through it and escaping. There is now a standing prize for some kind of varnish that will the better prevent the escape of hydrogen than anything now known. Hydrogen is employed as the unit of comparison with other elements, because it combines with them in a smaller proportionate weight than any other known substance.

Hydrogen is very combustible. If you set it on fire in combination with oxygen or common air, it will explode with a loud report. A bladder filled with one-third of oxygen and two-thirds hydrogen will make a stunning report. We once blew up a mixture of 1200 cubic inches, which tore open the reservoir and exhibited a force like that of gunpowder. Its effects were most stunning. Prof. Webster once had his clothing nearly torn off from him by an explosion of hydrogen. These accidents arose from the use of badly constructed instruments for burning it, called the oxyhydrogen blowpipe, or more commonly, the compound blowpipe. By means of this instrument the hardest known substance can be melted or burned.

There is one experiment which you can perform very easily: Take a small bottle and fit a good cork to it, and then bore a hole through the cork and force a pipe-stem through it so as to be perfectly tight. Now put into the bottle two ounces of very small nails, or bits of zinc, or iron shavings from a machine-shop; pour in just water enough to cover them, and then pour in about one-third as much sulphuric acid as there was of water. Hydrogen will immediately escape through the tube. Wait a minute till the air is all out of the bottle, because if you should set it on fire, it would blow up by the mixture of the air and hydrogen. Touch a lighted taper to the jet and you will have the philosophical candle. Hold an inverted tumbler over the flame and press it down upon it somewhat, and the candle will go out, but will continue to burn round the edges of the tumbler where the hydrogen is in contact with atmospheric air, Blow out your lamp and hold a bladder over it and you can collect the gas. Take an old pistol barrel, place your thumb over the vent, and hold the muzzle over the gas from the bottle and let it be partially filled with hydrogen, and then touch a lighted taper to the vent and it will explode with a smart report. Re-light the bottle, and as soon as the flame burns very small, so you can scarcely see it, let down over it a glass tube about three-fourths of an inch in diameter and a foot or more in length, and you will hear the sweetest musical tones. A tune may be played on a flute by means of these tones. After you have exhausted your list of experiments, pour out the liquid contents of your bottle on a plate and let it evaporate, and you will have a new salt formed.